

A Tale of Three Crises in the Past Two Decades:

How Has the Nasdaq-100 Evolved?

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Introduction

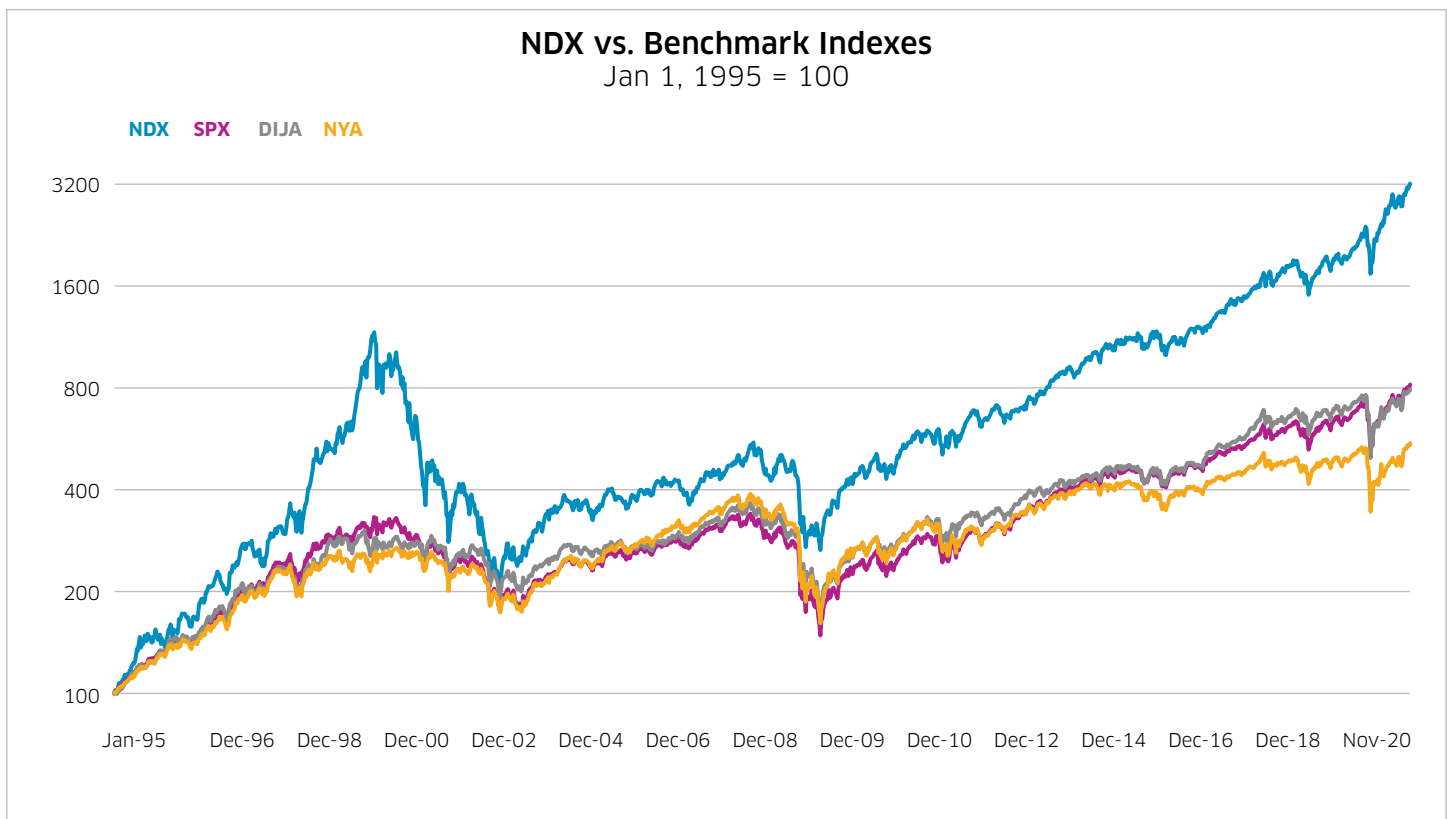
As the global coronavirus pandemic wears on, the ability of the US stock market to set new record highs may seem counterintuitive at first. This is particularly true of the Nasdaq-100 Index (NDX), which was up a staggering 47.6% in 2020, and 48.9% on a total return basis. At this unique juncture in history, NDX compares favorably with other broad-based indexes, which was not the case during the prior two periods of severe market disruption in the past two decades: the Tech Bubble/Bust at the turn of the century, and the Financial Crisis of 2008/2009. By examining index performance over the course of three distinct market crises, one can gain an understanding of how the Nasdaq-100 has evolved and, ultimately, explain why it has outperformed so dramatically this time around. Most crucially, the profound improvement in the fundamentals underlying the index proves that the Nasdaq-100 now tracks largely mature companies that not only comprise a substantial portion of the overall US equity market, but collectively represent the new economy of the 21st century.

Performance Overview

We compare NDX with three other benchmarks:

- **The S&P 500 (SPX)**, the leading benchmark for US equities. The overlap between SPX and NDX components has been steadily growing (more details presented below);
- **The Dow Jones Industrial Average (DJIA)**, the venerable blue-chip benchmark which has historically included few Nasdaq-listed stocks. Currently, of its 30 components, it includes only 6 Nasdaq-listed stocks, after the addition of Amgen in August 2020;
- **The NYSE Composite Index (NYA)** made up of NYSE-listed stocks, numbering into the thousands of components. This index is not widely known. By construction, there is no overlap between its components and those of the Nasdaq-100, making it a useful comparison benchmark.

The following graph provides a 26-year overview of the performance of the four benchmarks under consideration, as of December 31, 2020.



The last quarter century has clearly been a period of strong returns for the US stock market despite multiple crises, with the non-Nasdaq benchmarks up by a factor of between 5 and 7. The Nasdaq-100 stands out, though, with a cumulative (price) return factor of nearly 31 times. This performance has been much stronger, accompanied by higher volatility. By calculating the ratio of annualized return to standard deviation for each benchmark, we observe NDX with the highest value – indicating a favorable tradeoff between elevated risk and superior performance. In comparing returns over long time periods, it is important to take dividends into account. Total return indexes do this by assuming that dividend proceeds are reinvesting into the index portfolio. The following table provides index performance and volatility for the 26-year period running from the start of 1995 to the end of 2020.

Annualized Returns Over Entire 26-Year Period

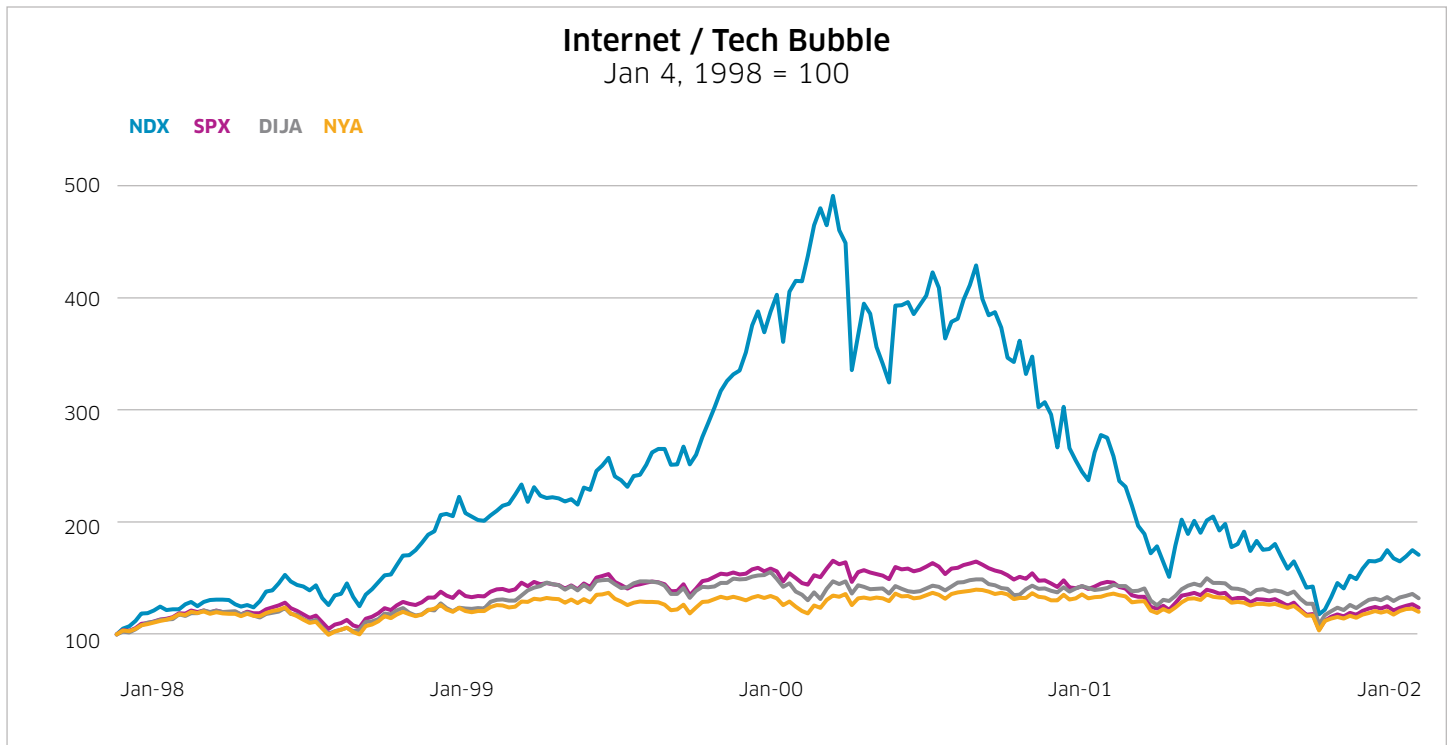
	PRICE RETURN				TOTAL RETURN		
	NDX	SPX	DJIA	NYA	XNDX ¹	SPXT	DJITR
Mean	13.38%	8.08%	7.99%	6.54%	13.98%	10.01%	10.29%
Std Deviation	25.83%	16.58%	16.27%	16.86%	25.82%	16.57%	16.25%
Mean/SD ratio	0.518	0.487	0.491	0.388	0.541	0.604	0.633

Having established its remarkable performance over the cumulative period, we may now compare the performance of the Nasdaq-100 across each of the three most dramatic market events during the last quarter century: the Tech Bubble of the late 1990s and subsequent Bust, the Financial Crisis of 2008/2009, and the current Covid-19 pandemic.

¹ Total return series are available for SPX and DJIA for the entire period. The total return index for NDX was launched in October 2000, thus NDX price returns have been substituted for earlier dates. Since the dividend yield of the Nasdaq-100 was low in the late 1990s, the total return results for XNDX in the table are marginally understated. The total return index for NYA began in February 2012, and is thus excluded from the analysis.

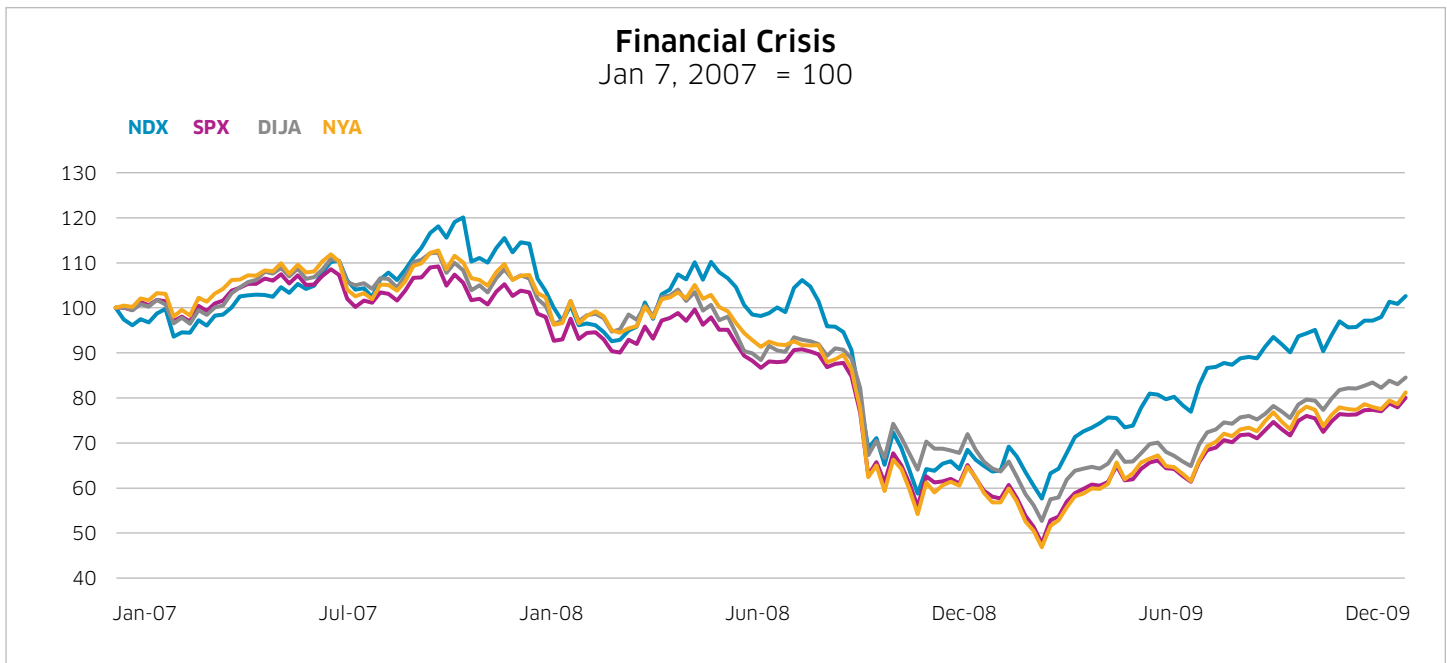
Internet / Tech Bubble:

The Tech Bubble was mainly confined to Nasdaq-listed stocks, and highly impactful to the Nasdaq-100. The nearly five-fold increase in the index from 1998 to 2000 was followed by an equally severe decline during the next two years, making for a truly remarkable volatility event. Though the downside portion of the event created pain for many investors, it was limited to a relatively small portion of the US stock market. As a result of several years of heightened attention from media, day-traders, and the general public alike, Nasdaq's reputation was forever cemented as the home of technology and innovation. The other benchmarks also exhibited a rise and fall during the timeframe, but of much lower magnitude.



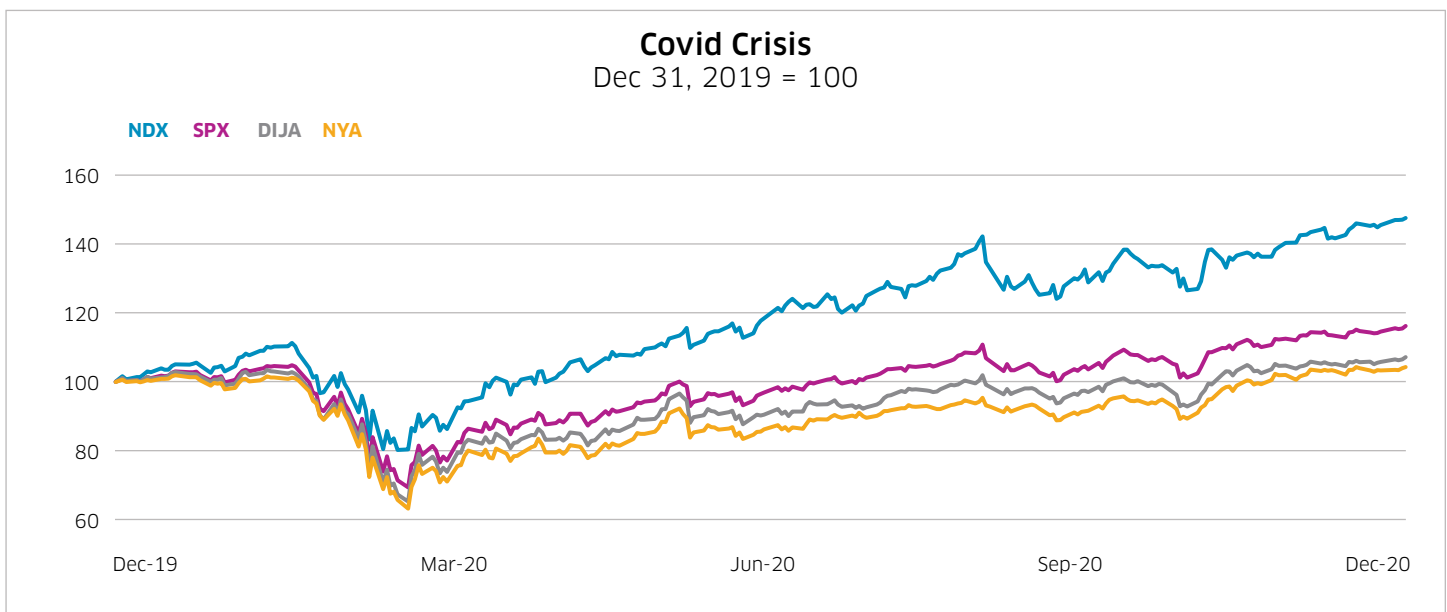
Financial Crisis:

The Financial Crisis was a more universal phenomenon. The rapid drop in NDX in the fall of 2008 was a mirror image of the other benchmarks, with smaller, subsequent drops through early 2009. From the start of September 2008 to the lows in March 2009, all four indexes fell by almost 50%. By the end of 2009, however, NDX was up 78% from its low, while the other benchmarks were up an average of only 65%. This difference in the strength of the initial recovery was in part due to the NDX's lack of exposure to banks and other financial sector companies, which are specifically excluded from the index by its methodology. Nonetheless, the Nasdaq-100 still suffered greatly during a market event that left few sectors and companies unscathed. Its more robust recovery presaged a painful decade of underperformance for financial (and, for that matter, energy) companies, granting the index an immediate leg up on its competitor benchmarks.

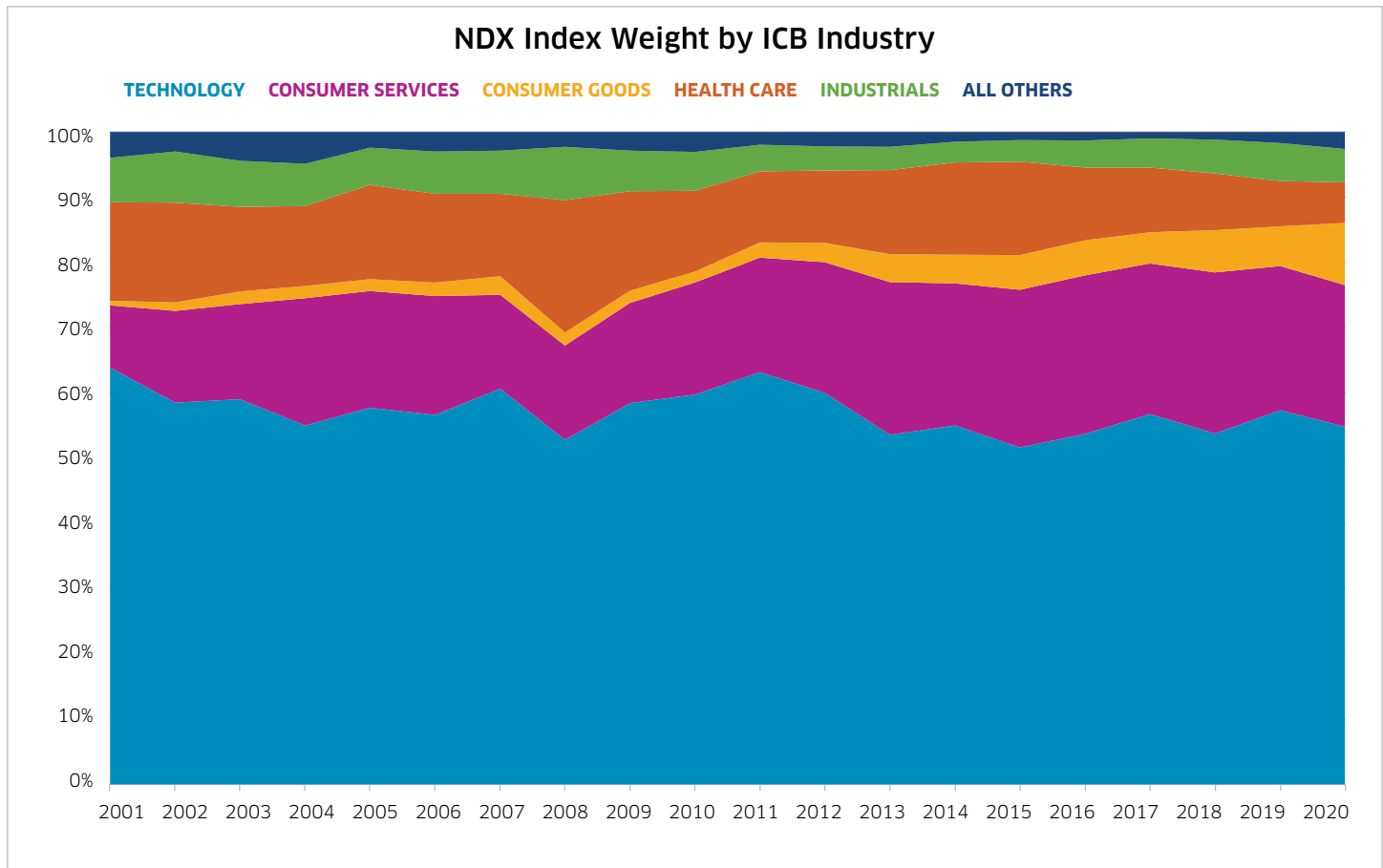


Covid Crisis:

The coronavirus pandemic and associated economic crisis are still underway. All four indexes experienced sudden drops beginning in late February 2020, bottoming out in mid-to-late March. The drop in NDX was least severe, down only 28% from February 19 to the lows on March 23. The three other benchmarks dropped by at least 34%, with the NYA Index down almost 38%. More significant, though, was the even stronger recovery of NDX, which by mid-April had already reached levels seen at the start of the year. By the beginning of September, the index had set a new all-time record high, nearly three months sooner than any of the comparison benchmarks would do. The muted drop at the onset of the crisis, coupled with the sharper and faster recovery, reflect the Nasdaq-100's central role in leading the economy through an epic disruption. The index's companies had not only grown and matured substantially since the prior two crises; they had become so central to the new economy of the 21st century that the technologies necessary to facilitate work, school, commerce, consumption, and recreation from home almost exclusively stemmed from their innovations over the past two decades.



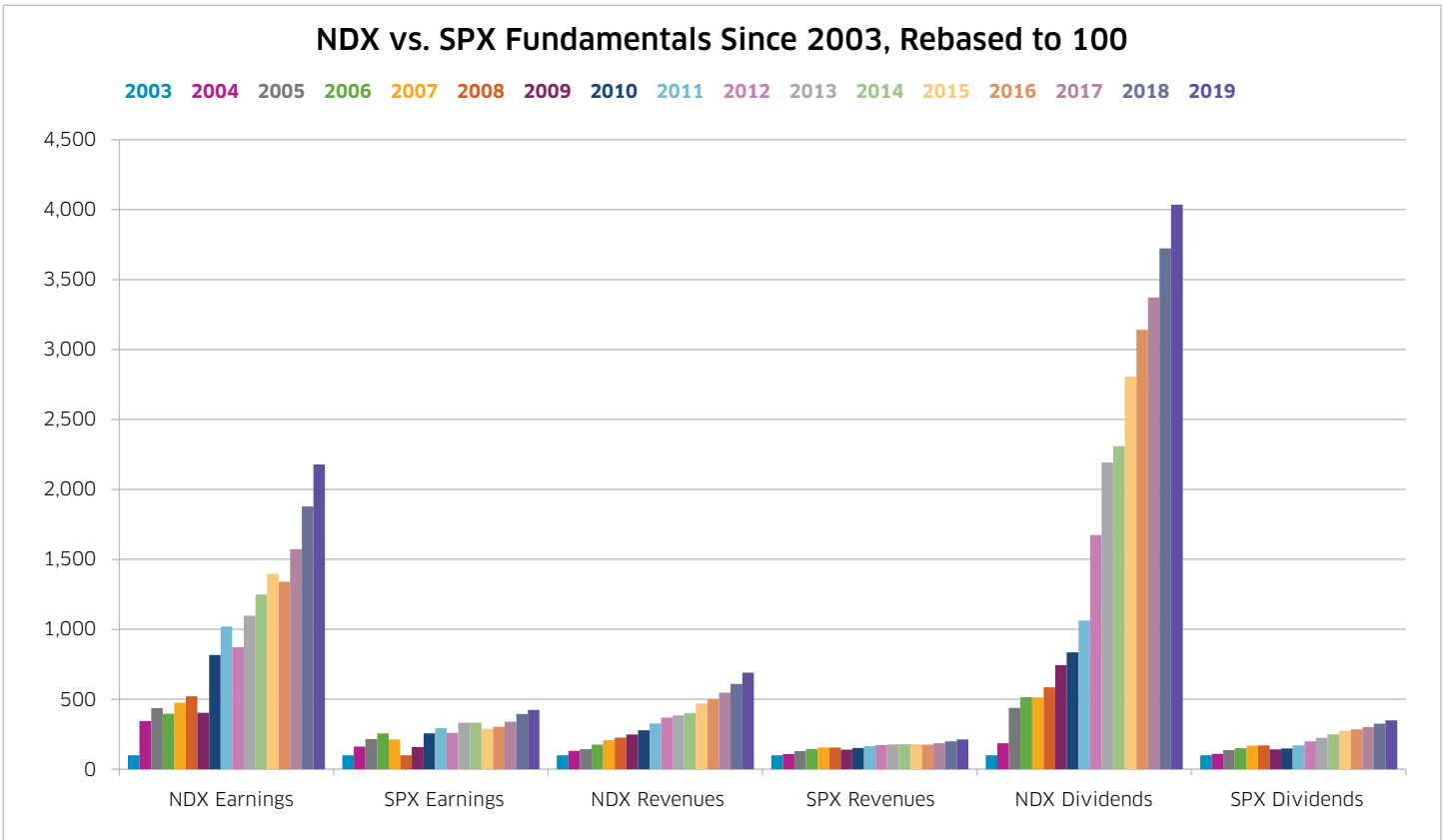
What changed at a fundamental level about the index during this timeframe? One constant has been its sector exposures. Technology has represented a remarkably stable percentage of the index weight, ranging from 52-64% and, most recently, 55%. Basic Materials, Oil & Gas, Telecommunications, and Utilities have always been *de minimus*, while Financials remain excluded. The rest of the index weight has seen modest variation across a mix of Consumer Goods and Services, Industrials, and Health Care.



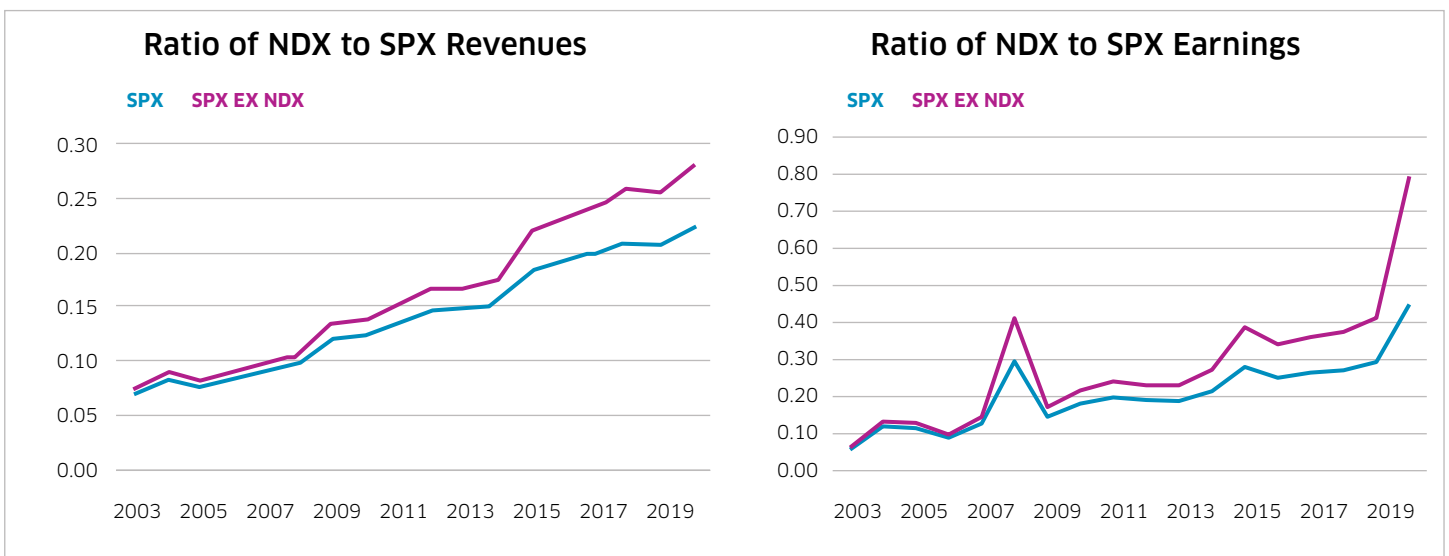
Instead, the index has changed most dramatically in terms of its financial fundamentals – the building blocks of revenues, earnings, and dividends – which signify overall corporate health.

Growth of Fundamentals

The long-run trends in revenues, earnings and dividends provide a fundamental rationale for the growth of the Nasdaq-100 in both size and importance. With respect to revenues, NDX companies had grown by a factor of 6.5 times on a full-year basis between 2003 and 2019, just before the onset of the pandemic. Earnings soared by an even more impressive 22 times, while dividends rose an astounding 40 times. In compound annual growth rate terms, revenues have been growing at around 13% each year, while earnings have been growing at 21% and dividends at 26%. Compared to the S&P 500, which itself encompasses a large portion of the Nasdaq-100, the story becomes quite clear. While it has been a solid two decade stretch for the broader US equity market, NDX has trounced its older, more established large-cap competitor in the arena of financial fundamentals. A major driver of that story relates back to the ongoing sector orientation of NDX, with Technology leading all other sectors – among US large and midcaps during the 2010s – in revenue growth. Beyond robust topline growth, which was often lacking during the Tech Bubble, the other crucial component has been the maturation of many Nasdaq-100 companies into highly profitable companies with a balanced focus on shareholder returns and innovation.



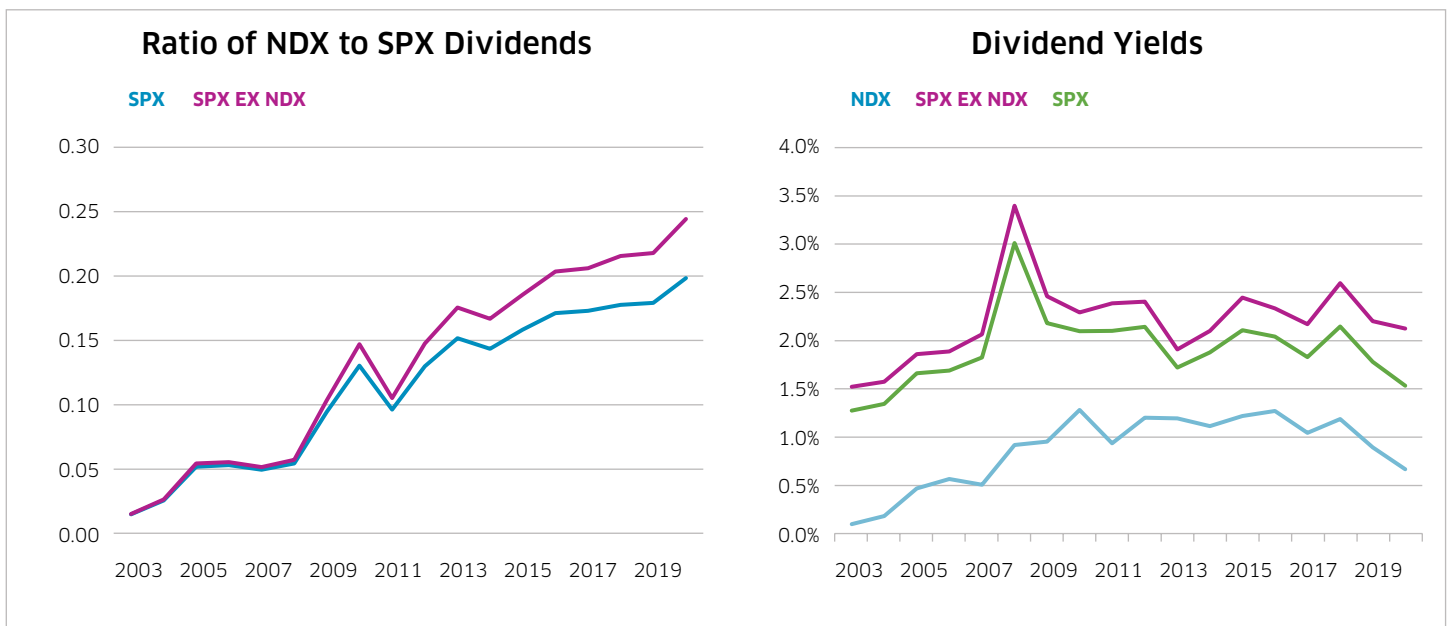
Consider three groups of stocks: NDX components, SPX components, and SPX components not in NDX (“SPX ex NDX”). Analysis of the latter category is of particular interest given zero overlap in the components, thereby providing the purest comparison between the two benchmarks. The first set of fundamental data visualize the three groups’ annual totals for each calendar year from 2003 through 2019, as well as an annualized estimate for 2020 based on three quarters of data, with NDX as the numerator in both ratios: first, compared to SPX in its entirety, and secondly, with respect to SPX ex NDX. We begin by looking at revenues and earnings.²



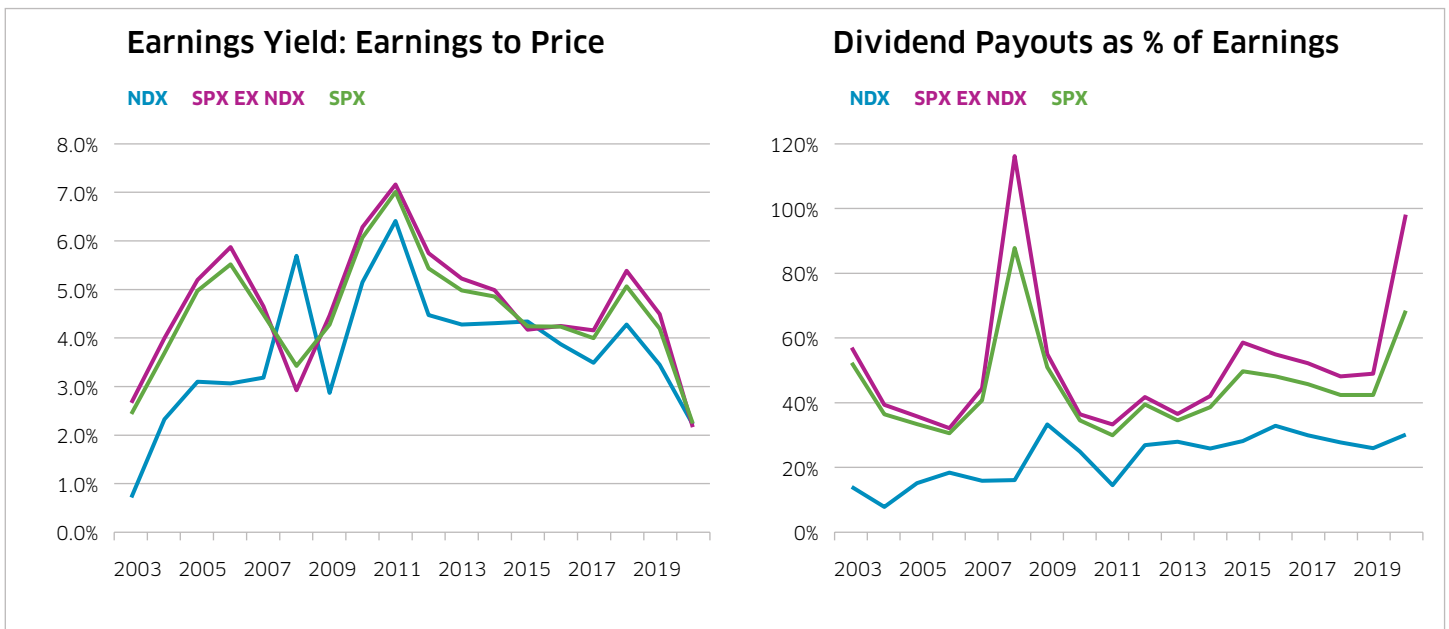
² The temporary jump in the earnings ratios in 2008 was driven by extraordinary losses reported by AIG and other Financials, all of which were exclusively SPX components.

NDX revenues have grown steadily in relation to SPX, from only 7% in 2003 to approximately 21% in 2019, rising slightly higher to 22% through three quarters of 2020 data. Relative to SPX ex NDX, revenues grew to almost 26% in 2019, and nearly 28% in 2020. While initially starting at a similar ratio, there has been an even steeper rise in the level of NDX earnings, approaching 30% relative to the SPX by 2019, and on track for 45% in 2020. Relative to SPX ex NDX, earnings grew to exceed 40% in 2019, and almost 80% in 2020. Next, we look at dividends.

Immediately following the Tech Bubble/Bust, dividends paid by NDX components were miniscule, but have been steadily increasing towards nearly 20% of SPX levels (25% of SPX ex NDX). In terms of overall dividend yield, NDX has consistently narrowed the gap with SPX from 118 basis points (bps) in 2003 to only 89 bps as of full-year 2019. Based on three quarters of reported financials in 2020, the gap narrowed further to 86 bps. Yet this analysis obscures what has taken place behind the scenes, because the gap with SPX ex NDX has remained essentially unchanged, growing from 142 bps in 2003 to 146 bps in 2020 in a very irregular fashion (as tight as 72 bps in 2013, and as wide as 248 bps in 2008). As valuations have gyrated – especially among high-dividend sectors such as Financials and Energy – the yield gap can occasionally suggest that SPX ex NDX companies are becoming more competitive in this arena; in reality, sector-wide price declines artificially (and temporarily) inflate their attractiveness as sources of income.

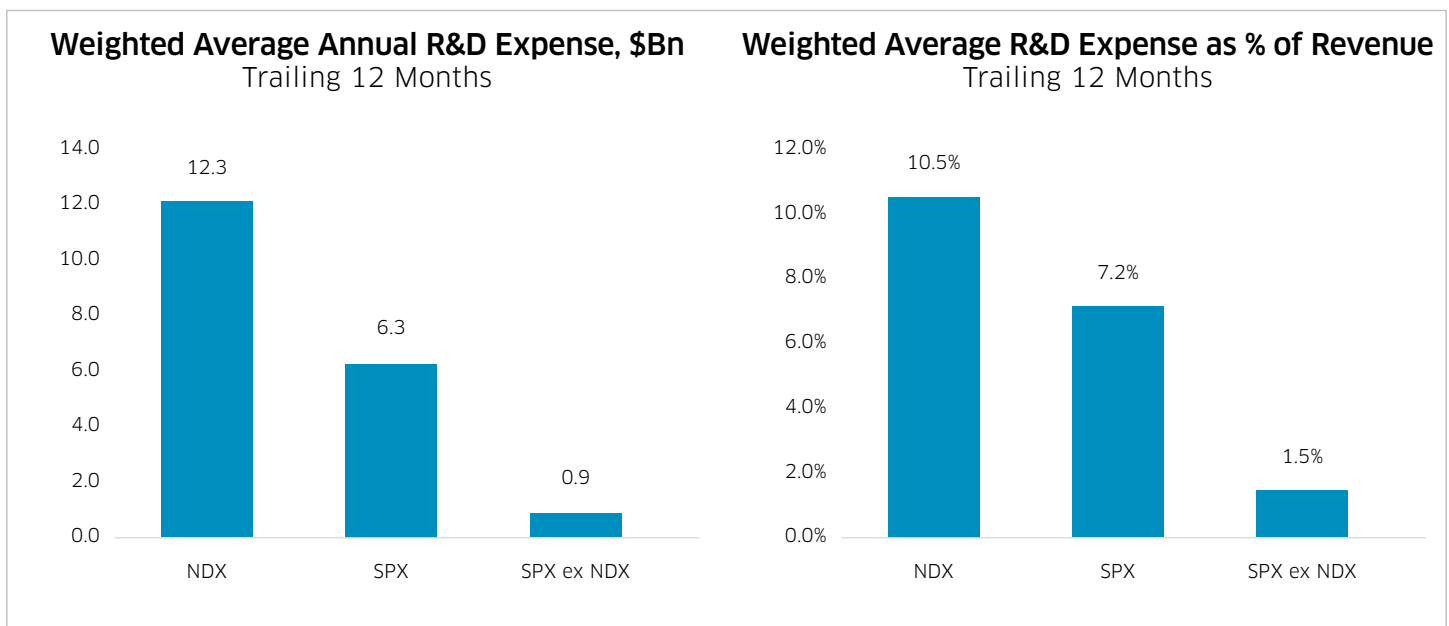


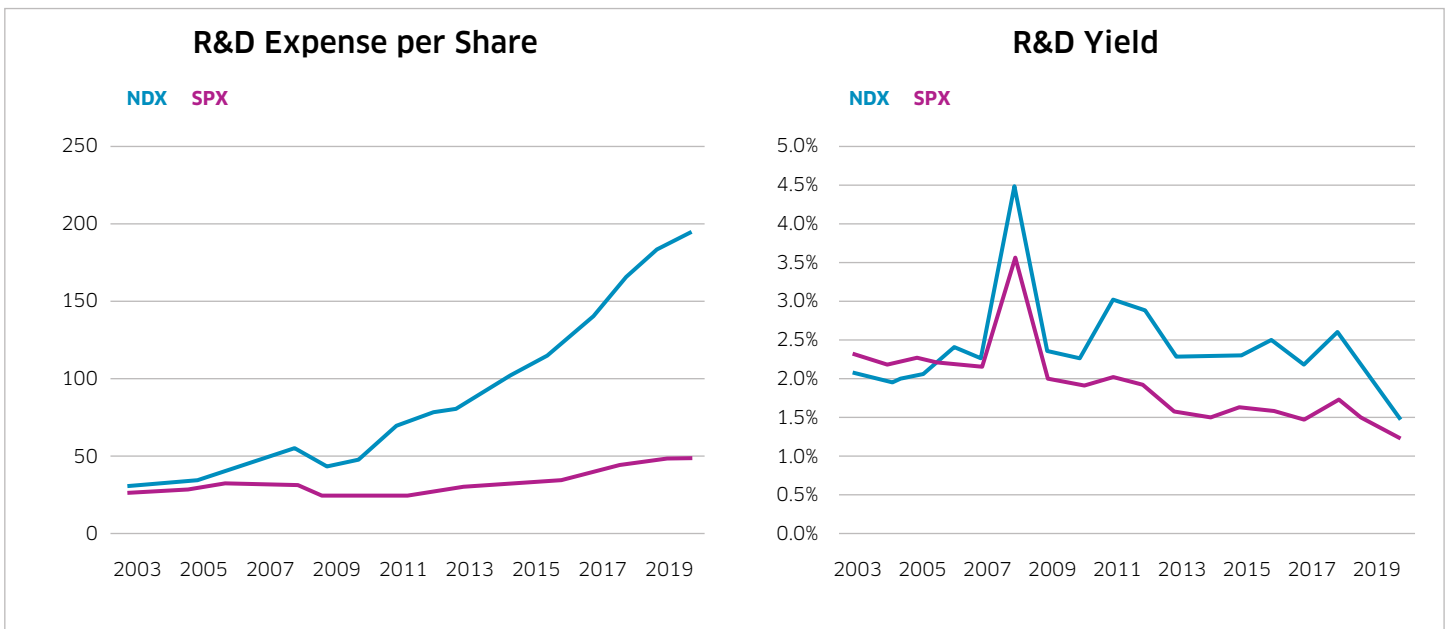
A much different pattern characterizes the earnings yield, which is simply the inverse of the P/E ratio. Relative to SPX, NDX has narrowed the yield differential from 172 bps to only 75 bps (as of full-year 2019) by growing its earnings at a much faster rate. Using partial data for 2020, the gap collapsed to only 2 bps. Relative to SPX ex NDX, the gap narrowed from 195 bps in 2003 to 104 bps in 2019, collapsing to -5 bps in 2020. Finally, we compare dividends with earnings to get a sense of the change in payout ratios.



The SPX-ex-NDX payout ratio exceeded 100% in 2008 due to anomalously low earnings driven by AIG and other financial firms, but in 2020 is once again approaching 100%, which suggests unsustainable dividend levels. The NDX payout ratio, meanwhile, has stagnated over the past few years at a level around 30% - roughly double where it was in 2003, and consistently lower than SPX. This suggests a higher propensity for NDX companies to retain earnings in order to reinvest in growth opportunities.

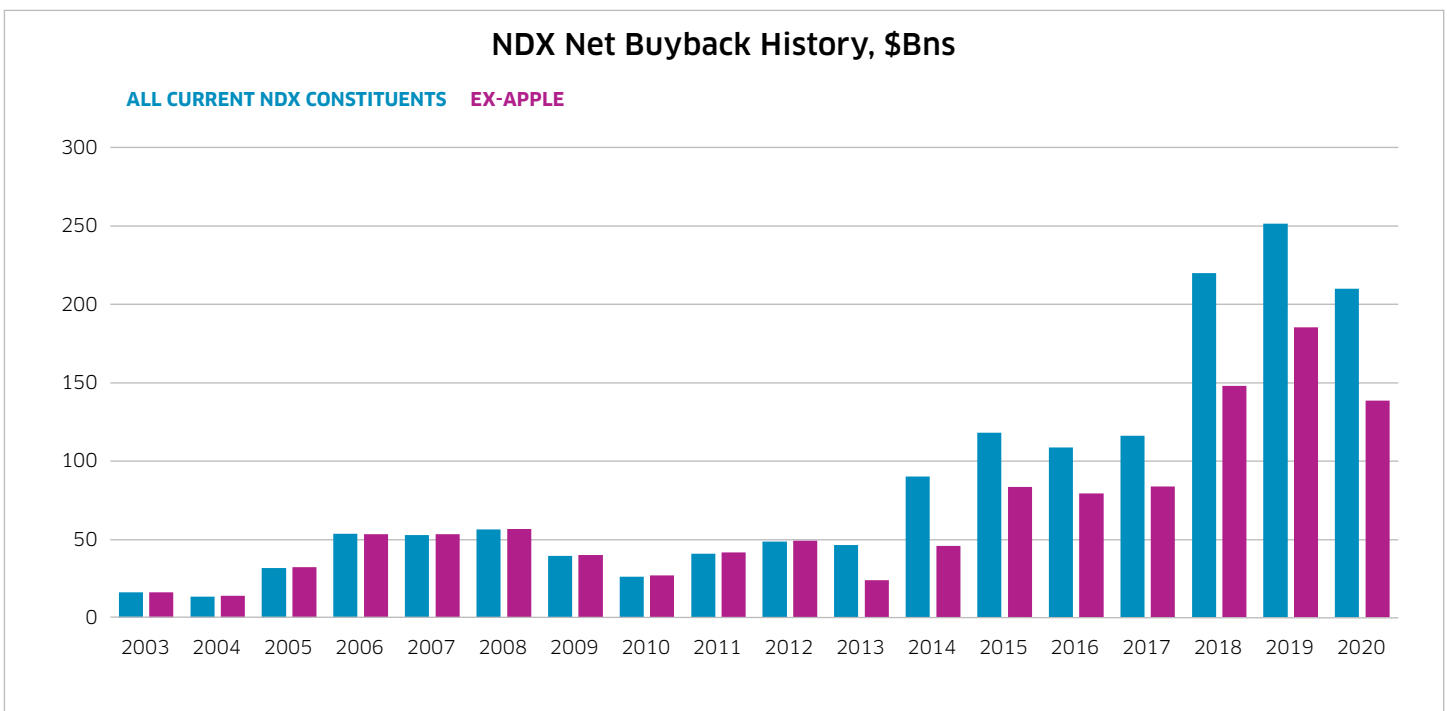
Differences in reinvestment patterns are apparent when comparing the average annual R&D expense across each of the three groups of stocks. We see a material advantage among Nasdaq-100 companies, on an absolute basis in terms of average expense per index constituent, as well as on a relative basis with respect to revenues. Since 2003, annual R&D expense has grown by 537% for NDX vs. only 83% for SPX, on a per-share basis. The Nasdaq-100 index truly has become the home for real-world innovation, which increasingly appears to drive multiple aspects of financial outperformance.





As of November 30, 2020. R&D Expense per Share data via Bloomberg. R&D Yield calculated as Expense per Share divided by Index Share Price.

A lower payout ratio also obscures a higher propensity among NDX firms to return capital in the form of share buybacks. Indeed, the growth in buybacks has been exponential, especially during the past decade; over the past three years, the current set of NDX constituents averaged \$230 billion in annual share repurchases (net of issuances), up more than 14 times vs. 2003. While Apple’s buybacks have made up a disproportionate share, the growth ex-Apple has also been impressive, up 10 times vs. 2003 levels. The recent pace of buybacks is nearly tripling the amount paid out by Nasdaq-100 companies in the form of traditional cash dividends, which totaled \$88.7 billion in full-year 2019.

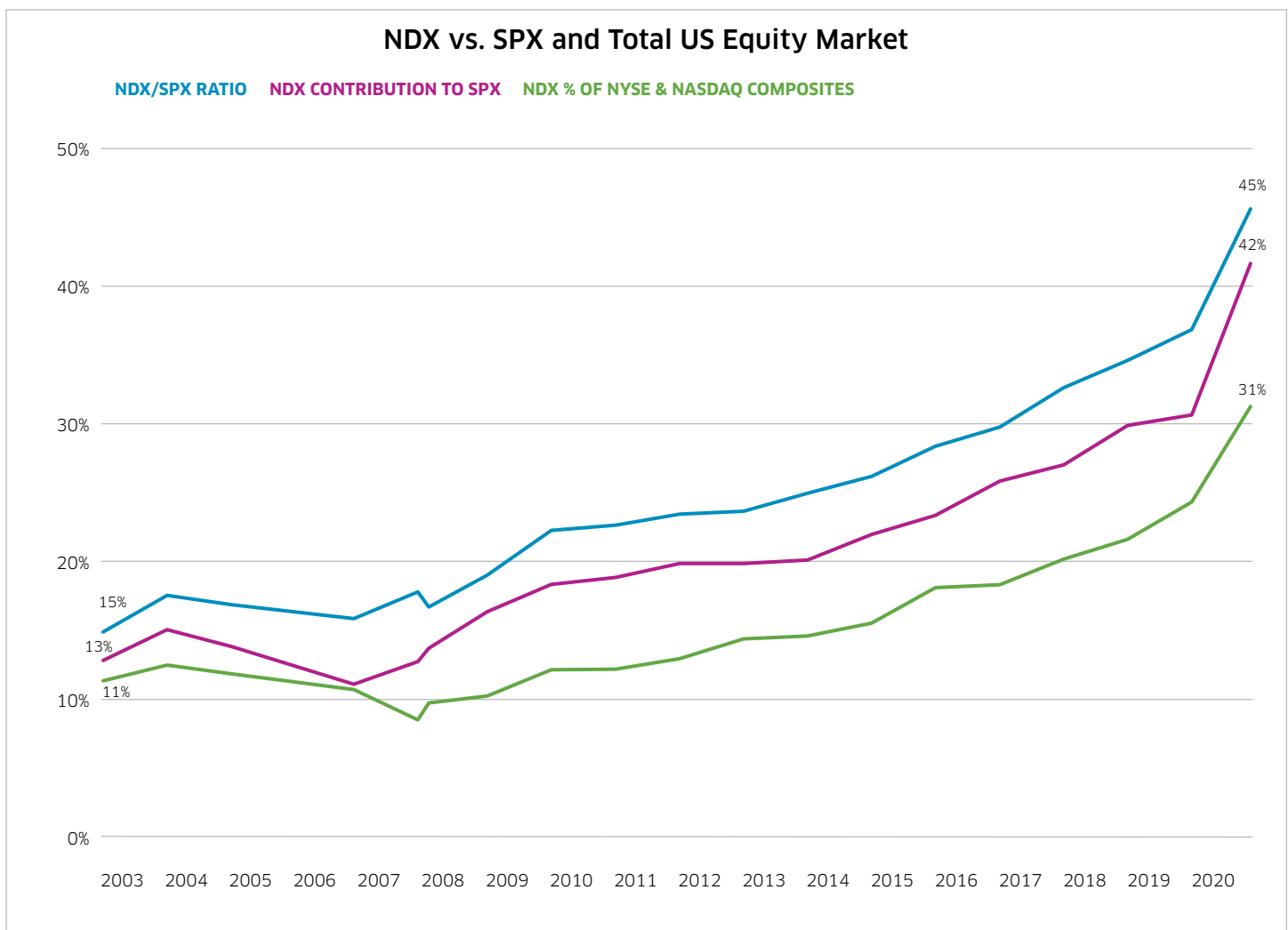


Nasdaq-100 Becomes a Bigger Part of US Stock Market

The components of the NDX currently represent just under one-third of the total market capitalization of all US-listed equities. The next chart illustrates the steady growth of the fraction of the US stock market made up by the Nasdaq-100, using the total market capitalizations of the NYSE Composite and Nasdaq Composite indexes as proxies for the US equity market.³ Prior to the Financial Crisis, the NDX Index comprised between 9-13% of the entire US stock market. During the Covid crisis, this growth trend sharply accelerated to upwards of 30%.

The graph also shows the trend in two key ratios relative to the S&P500: the market capitalization of NDX components versus all SPX components, and the percentage of SPX market capitalization contributed by NDX components.

Both series show steady growth since the Financial Crisis, with an acceleration of the trend during the last year. The market cap of the Nasdaq-100 is approaching half that of the SPX, while NDX components contribute just over 40% of the capitalization of the SPX as of year-end 2020. This growing level of overlap explains the increasing correlation between the two indexes, which is also evident when studying the evolution of the 10 largest constituents of each.



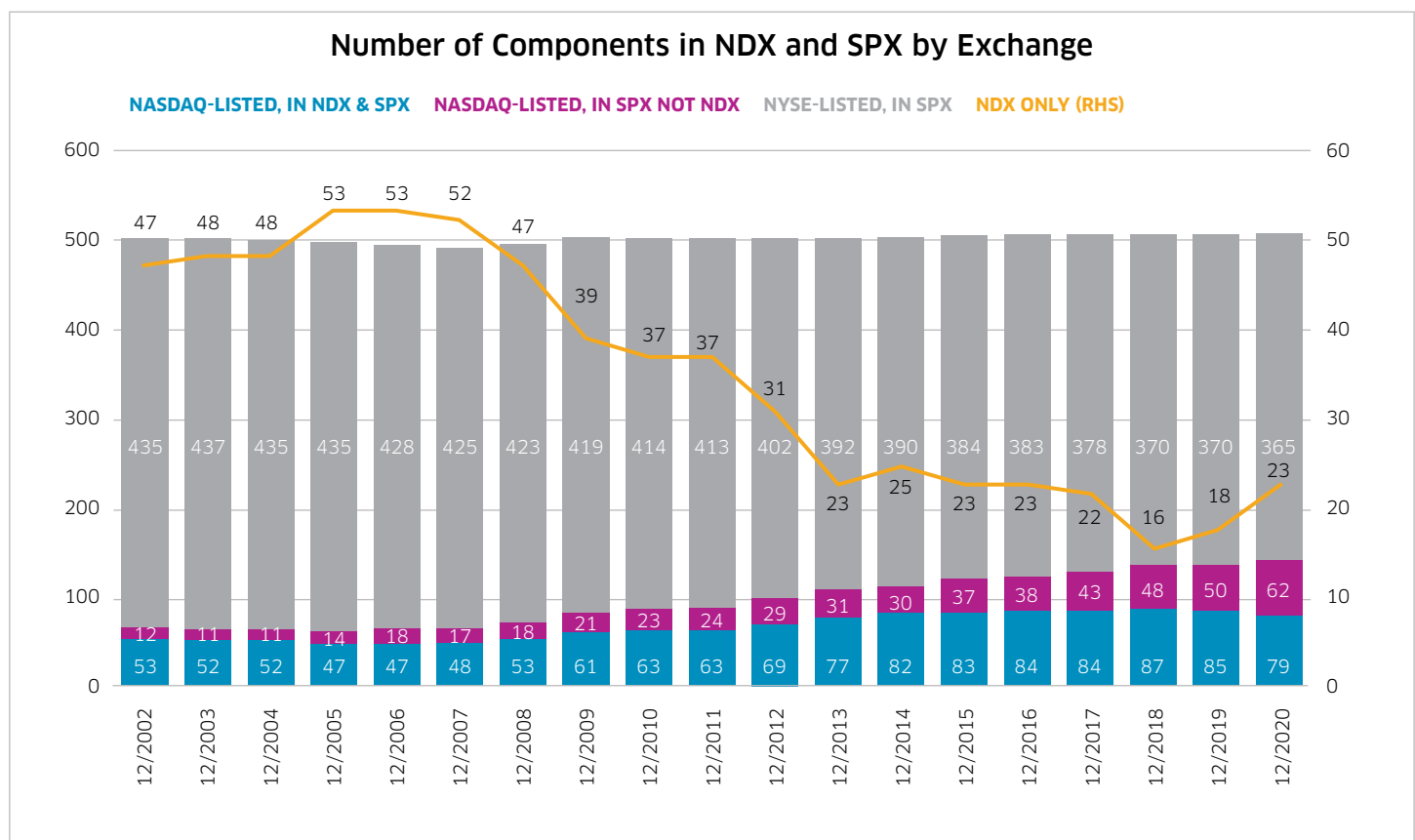
³ To be clear, this excludes the market capitalizations of any ETFs listed on NYSE or Nasdaq.

Top 10 Index Components

JANUARY 2002		JANUARY 2009		JANUARY 2021	
NDX	SPX	NDX	SPX	NDX	SPX
Microsoft	General Electric	Microsoft	Exxon Mobil	Apple	Apple
Intel	Microsoft	Cisco	Wal-Mart	Microsoft	Microsoft
Cisco	Wal-Mart	Oracle	Procter & Gamble	Amazon	Amazon
Oracle	Exxon Mobil	Google	Johnson & Johnson	Alphabet	Alphabet
Dell Computer	Intel	Apple	Microsoft	Facebook	Facebook
Amgen	Pfizer	Intel	AT&T	Tesla ⁴	Tesla
Applied Materials	Citigroup	Amgen	Chevron	NVIDIA	Berkshire Hathaway
Ericsson	Cisco	Qualcomm	General Electric	PayPal	Johnson & Johnson
Sun Microsystems	AI	Gilead Sciences	IBM	Adobe	JPMorgan Chase
Qualcomm	IBM	Comcast	Coca-Cola	Comcast	Visa

Overlap with S&P 500

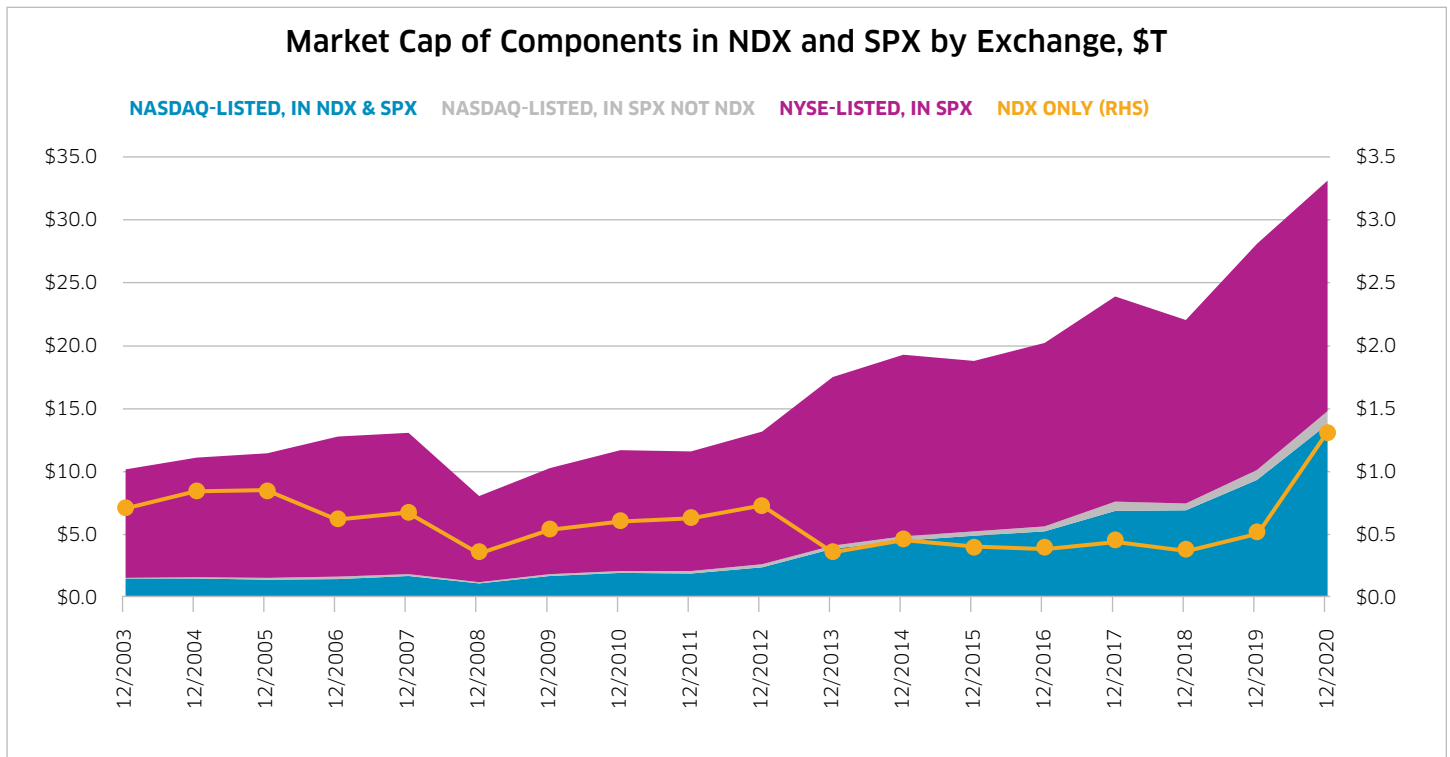
We now take a deeper look at the change in overlap between the two indexes. The following chart shows the number of components in each of four categories, as of the end of the indicated year. Note that the three shaded sections sum to about 500, while the blue section plus the purple line sum to about 100, with the latter graphed on a separate right-hand axis.⁵



⁴ Note that Tesla entered the S&P500 in December 2020 as the 6th-largest index constituent – by far the biggest addition made to the index in its history. Tesla was added to the Nasdaq-100 in July 2013, and in the meantime, generated a return of approximately 2,500%.

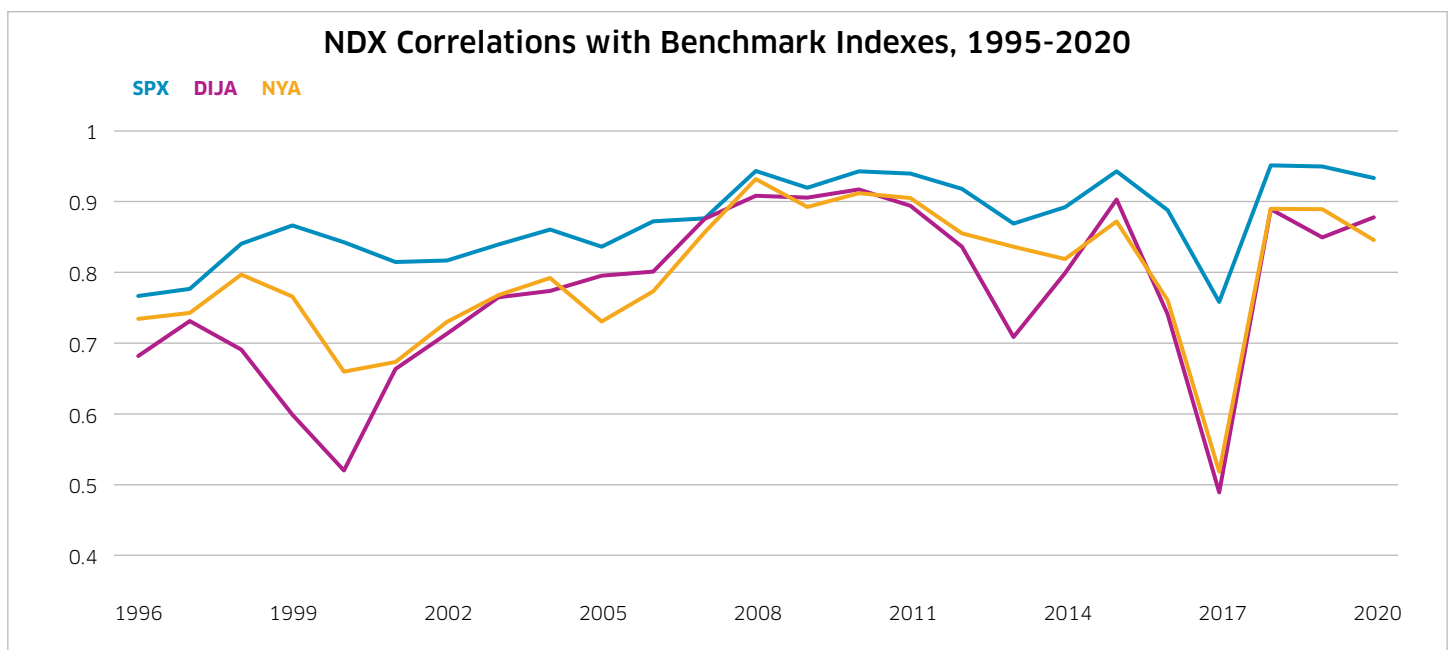
⁵ During the time frame of this table, the policies of both indexes were updated. Originally, both indexes limited the number of components to 100 or 500. Subsequently, the limit was applied to issuers rather than issues, so that multiple issues from the same issuer can be in the index.

The number of components depicted by the blue-shaded section and the purple line has remained fairly stable since 2013, but their corresponding market capitalizations have soared. Meanwhile, there has been an increasing number of smaller Nasdaq-listed stocks included in SPX but not in NDX, with a similar trend in market cap growth. As a corollary, the number of NYSE-listed SPX components has been declining, and the group's market capitalization has flat-lined.



Changing Correlations of Nasdaq-100 with Broader Market

The following graph shows the correlation between NDX and the three benchmark indexes, as derived from weekly returns data. The correlations are then computed and plotted for each calendar year.

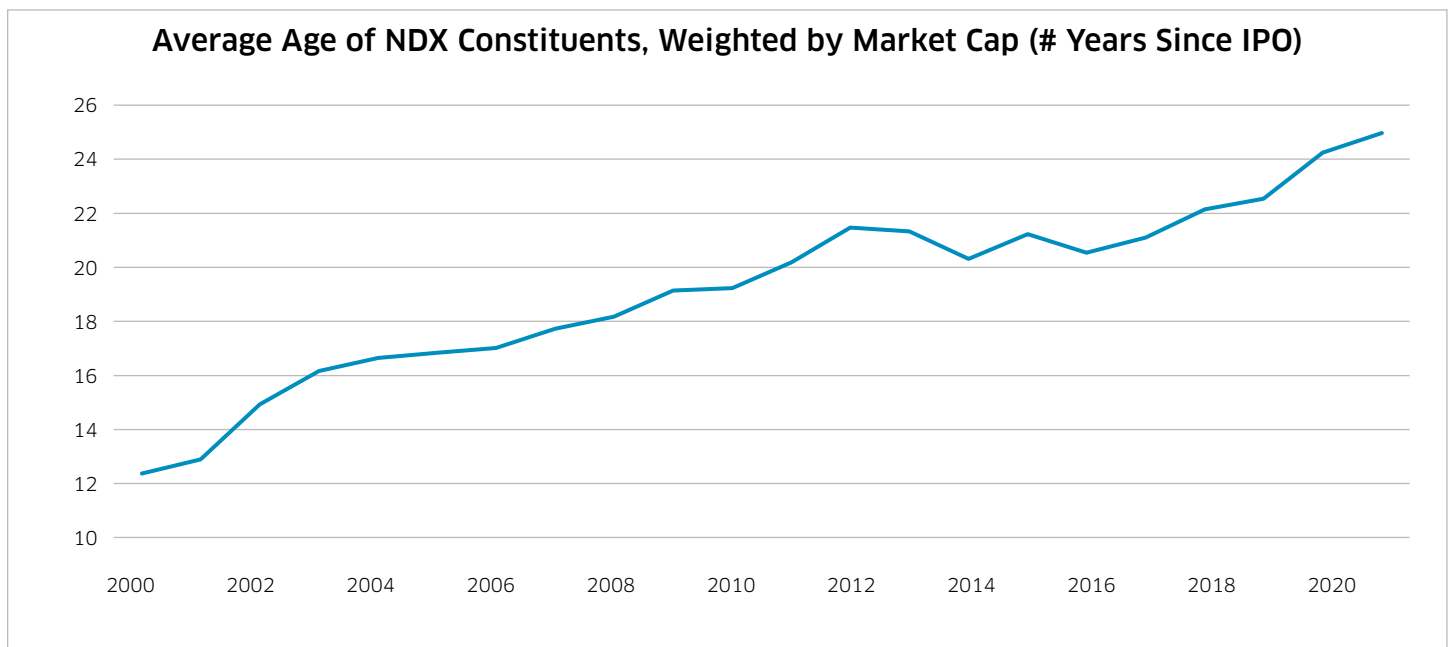


A number of insights are evident from the graph. Overall, there has been an upward drift in correlations over the last 26 years, as the NDX has become more mainstream and grown to represent an ever larger fraction of the overall market. The correlation with SPX has always been stronger than with the two other benchmarks. The correlation of NDX with DJIA and NYA was especially weak during the Tech Bubble as well as in 2017, which was a period of historically low stock market volatility. In times of low volatility, correlations naturally tend to decline due to the lack of a strong macro signal – or, in the case of 2017, a backdrop of clear, bullish macro signals that included well-telegraphed corporate tax cuts and very gradual tightening by the Federal Reserve. Conversely, the correlation with all three benchmarks was highest during and immediately after the Financial Crisis, with shorter-duration peaks around the market corrections in 2015 and 2018.

Ongoing Maturation of NDX

A quick analysis of the market cap-weighted average year of incorporation across four groups of index components supports the notion that Nasdaq-listed stocks – and NDX components specifically – are younger, more innovative companies than those listed on the NYSE (and by extension, included in the SPX). The average NDX component incorporated in 1992, and for SPX overall, in 1983. For SPX components listed on the NYSE, the average year of incorporation is 1976, while for the Nasdaq-listed portion, 1991.

It is also instructive to trace how the age profile of NDX components has changed. The following graph shows company age as represented by time since IPO, weighted by current market capitalization. In 2000, the average time since IPO was about 12 years. That number has steadily increased, so that by 2020 it was about 25 years. In other words, after the passage of 20 years, the average NDX company grew 13 years older. As a result of ongoing IPOs that surge into the ranks of large-caps within a few years, NDX components are not aging as fast as the passage of time – but they *are* maturing, on balance. With age and the experience of multiple market cycles comes greater attention to company longevity and shareholder satisfaction, which naturally encourages enhanced focus on business model stability and return of capital via dividends or buybacks.



Summary

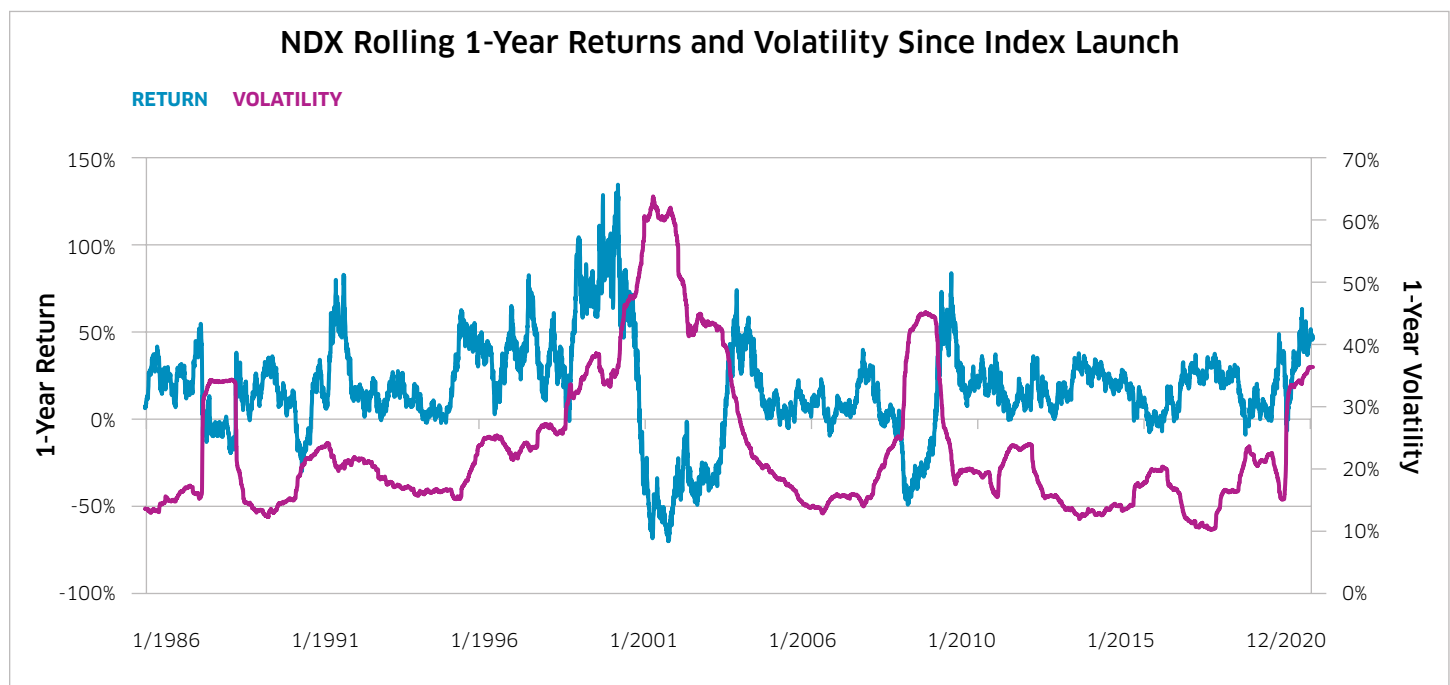
The Nasdaq-100 Index has evolved substantially during the last two and a half decades. The 'teenage' NDX of the Tech Bubble era has matured as a result of its constituents growing older, larger, and more profitable. Today's NDX components represent a substantial portion of the US stock market, and reflect a more globalized, digitized, technology and innovation-driven economy.

In light of these changes, it is useful to revisit the 26-year performance statistics presented at the beginning of this paper. The following provides results for only the last 16 years, a period including the Financial Crisis but excluding the Tech Bubble.

Annualized Returns from 2005-Present

	PRICE RETURN				TOTAL RETURN		
	NDX	SPX	DJIA	NYA	XNDX	SPXT	DJITR
Mean	12.94%	7.14%	6.60%	4.45%	13.87%	9.20%	9.12%
Std Deviation	19.76%	17.56%	16.93%	18.68%	19.75%	17.53%	16.89%
Mean/SD ratio	0.655	0.407	0.390	0.238	0.703	0.525	0.540

Exclusion of the Tech Bubble substantially reduces the perceived historical volatility of the NDX Index, while reducing the mean annualized return by only a small amount. During this time period, the ratio of mean return to volatility appears extremely favorable, in terms of both price and total returns. Indeed, the Tech Bubble was a volatility event like no other for the Nasdaq-100, with one-year realized volatility peaking at more than 60% -- well above the Financial Crisis and the October 1987 Crash -- and far surpassing that of the Covid-19 crisis. As of year-end 2020, one-year realized volatility was 36.4%, which is certainly elevated compared to the 35-year average reading of 23.7%, but not extreme by any stretch.



However one chooses to compare the Nasdaq-100 to other benchmarks, it seems clear that its outperformance during the current crisis stems not from randomness, but from sustained improvements in index fundamentals, on both an absolute and relative basis. Although current valuations do appear somewhat lofty with the index P/E ratio approaching 40, it is a far cry from the peak of nearly 250 witnessed 20 years ago. Ever since that jarring episode announced the arrival of the Nasdaq-100 into the common financial lexicon, it has been a slow and steady grind in many ways: from stabilizing returns and improving fundamentals reinforcing each other, to declining volatility and normalizing valuations. In the process, the preeminent large-cap growth index in the US has earned its spot among the most popular and enduring benchmarks in the world.

Sources: Nasdaq Global Indexes, FactSet, Bloomberg.

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